



# **Documentation of A Natural Event Due to High Winds, September 29, 2002 Wallula, Washington**

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03-02-007  
April 2003

 Printed on Recycled Paper

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# **Documentation of A Natural Event Due to High Winds, September 29, 2002 Wallula, Washington**

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Prepared by:

Washington State Department of Ecology  
Air Quality Program

April 2003

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## Summary

On September 29, 2002, the Federal Reference Method monitor in Wallula, Washington measured a particulate matter, 10 microns and smaller (PM<sub>10</sub>) concentration of 197 µg/m<sup>3</sup>. This concentration exceeded the primary 24-hour PM<sub>10</sub> National Ambient Air Quality Standard (NAAQS) of 150 µg/m<sup>3</sup>. The Washington State Department of Ecology has determined that this exceedance was a natural event caused by high winds and thus should be excluded from assessments of the attainment status for the Wallula, Washington area. Ecology flagged the data point for September 29, 2002, in the AIRS database maintained by the U.S. Environmental Protection Agency (EPA) to indicate that a natural event was involved. This documentation is being submitted to EPA in support of the data flag for EPA's acknowledgement and flagging of the data point.

## EPA's Natural Events Policy

EPA issued the policy on "Areas Affected by PM-10 Natural Events" (hereafter referred to as Natural Events Policy or NEP) on May 30, 1996. EPA's reasons for issuing the NEP are described in the following terms:

In issuing the natural events policy, EPA now believes that, under certain circumstances, it is appropriate to again exclude PM-10 air quality data that are attributable to uncontrollable natural events from the decisions regarding an area's nonattainment status.

Under the policy, ambient PM<sub>10</sub> concentrations raised by unusually high winds are treated as uncontrollable natural events when the dust originates from nonanthropogenic sources, or when the dust originates from contributing anthropogenic sources controlled with best available control measures (BACM).

After natural events cause the PM<sub>10</sub> concentration to violate the PM<sub>10</sub> NAAQS, the NEP requires a state to develop a natural events action plan (NEAP) to deal with future exceedances. The NEP specifies that the NEAP is available for public review and comment. A state submits the NEAP to EPA for review and comment.

Under the NEP, when a state has reason to believe that natural events have caused monitored exceedances of the PM<sub>10</sub> standard, the state is responsible for establishing a clear causal relationship between the natural event and the exceedance. Documentation of the natural event should be sufficient to demonstrate that the natural event occurred and that it impacted a particular monitoring site. The documentation should provide evidence that concentrations at the monitoring site would not have exceeded the PM<sub>10</sub> standard in the absence of a natural event.

# Ecology's Response to High Wind Events on the Columbia Plateau

During the late 1980s and early 1990s, a large number of exceedances of the 24-hour standard for PM<sub>10</sub> were recorded in Spokane, Kennewick, and Wallula, Washington. Detailed examination of these exceedances showed a close correlation to high wind events. Upwind agricultural fields were identified as the chief source of the wind-blown dust. Accordingly, Ecology developed the *Natural Events Action Plan for High Wind Events in the Columbia Plateau* in March 1998, to deal with high wind natural events in eastern Washington. The Columbia Plateau NEAP addresses the NEP by providing for the following:

1. Notification of citizens when air quality is likely to be impaired due to high wind events.
2. Advice to citizens on steps to minimize exposure.
3. Development of a program to identify and implement controls for anthropogenic sources of windblown dust in the Columbia Plateau.

Ecology and the identified agricultural agencies continue to carry out the Columbia Plateau NEAP. Therefore, exceedances of the standard due to high wind natural events can be excluded from decisions on the area's attainment status after Ecology has identified and documented these events and forwarded the documentation to EPA.

The 1998 NEAP included Ecology's commitment to re-evaluate the NEAP at the end of 2001. The re-evaluation is currently in progress and a 2002 NEAP is presently in development.

In the spirit of the 2002 NEAP, this documentation includes a section on BACM implementation for agricultural fields, as it relates to the September 29, 2002 high wind event at Wallula, Washington. As well, it incorporates the application of Ecology's refined high wind event definition as criteria for evaluating high wind events. Ecology's definition of a high wind event is:

*A high wind event occurs when the wind entrains and suspends dust to the extent that concentrations of PM<sub>10</sub> are elevated. This typically occurs when the average hourly wind speed at 33 ft is 18 miles per hour or greater for two or more hours; or in excess of 13 miles per hour for two hours or more hours when conditions of higher susceptibility to wind erosion exist. A high wind event that exceeds the PM<sub>10</sub> standard is a natural event.*

These are intended to serve as transitional elements as NEAP implementation shifts from the 1998 NEAP to the 2002 NEAP. The 2002 NEAP will include the high wind event definition and Ecology's finding that BACM for agricultural fields is being implemented on the Columbia Plateau.

# Evaluation of the September 29, 2002 Exceedance at Wallula, Washington

1. Wallula PM<sub>10</sub> Data: The Wallula monitor operates on a 1-in-6-day schedule. PM<sub>10</sub> data for 2001, as well as data for January through September, 2002, are found in Appendix A. The average PM<sub>10</sub> concentration for 2001 was 29 µg/m<sup>3</sup>. Monthly maxima ranged from a low of 13 µg/m<sup>3</sup> in January and December, to a high of 53 µg/m<sup>3</sup> in July.

Data for 2002, through the month of September, shows an average concentration of 39 µg/m<sup>3</sup>. Monthly maxima ranged from a low of 9 µg/m<sup>3</sup> in February to a high of 77 µg/m<sup>3</sup> in September. The September 29, 2002, concentration of 197 µg/m<sup>3</sup> was the only monitored exceedance of the PM<sub>10</sub> NAAQS for the year; it was one of only two 24-hour concentrations over 100 µg/m<sup>3</sup> in 2002, with the other being a 134 µg/m<sup>3</sup> monitored concentration on May 2, 2002.

2. Meteorological Data: The Boise Cascade Pulp and Paper Mill operates meteorological equipment co-located with Ecology’s PM<sub>10</sub> monitor in Wallula, Washington. The data, found in Appendix B, shows wind speeds were generally low and from the northeast from about 2000, September 28, 2002 to about 0000, September 30, 2002. Wind directions shifted to the south and southwest from 0000 to 0300 and by 0400 wind speeds had increased to 18 mph. Wind speeds ranged from 18 to 31 mph from 0400, September 29, 2002 to 0000, September 30, 2002. Gusts ranged from 22 to 33 mph throughout this 20-hour period.

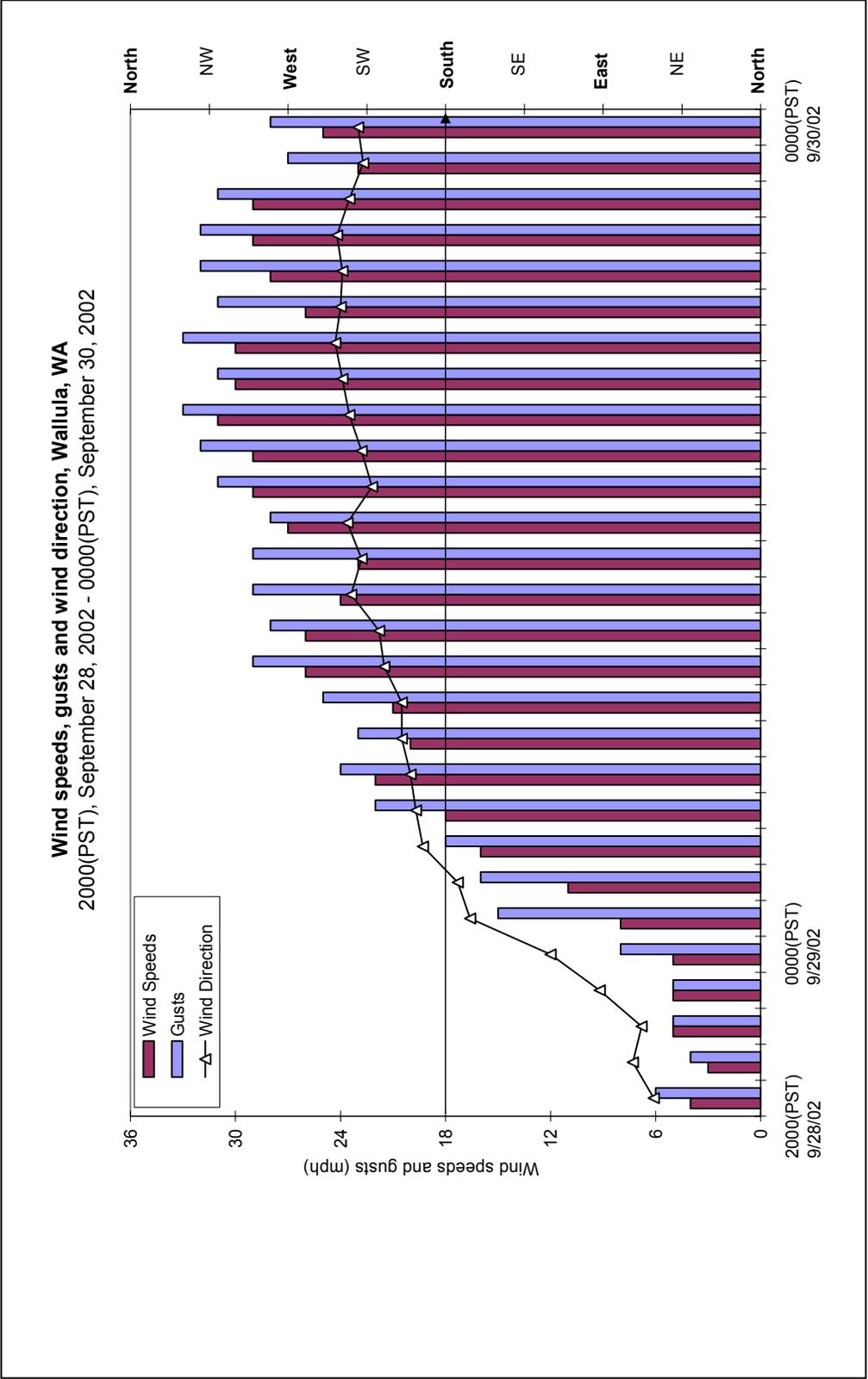
The data shows the winds at Wallula, Washington clearly met Ecology’s definition for a high wind event.

Table 1. Select Wind Observations for Wallula, Washington, September 29, 2002

Time (PST)	Wind Direction	Wind Speed (mph)	Gusts (mph)
1200	WSW	27	28
1300	SW	29	31
1400	SW	29	32
1500	WSW	31	33
1600	SW	30	31
1700	SW	30	33
1800	SW	26	31
1900	SW	28	32
2000	SW	29	32
2100	SW	29	31

Wind speeds, gusts and wind direction at Wallula, Washington, from 2000 (PST), September 28, 2002, to 0000 (PST), September 30, 2002 are displayed in Figure 1.

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**FIGURE 1**

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2.1. Precipitation Prior to September 29, 2002: Table 2 summarizes precipitation data from several reporting meteorological sites in the greater Wallula, Washington area. These sites are operated by Washington State University’s Public Agricultural Weather System (PAWS), (McNary, Eby, Finley, and Touchet) and the United States Bureau of Reclamation’s AGRIMET system (Hermiston and Echo). The sites are generally located in an arc ranging from south to west, upwind of Wallula, Washington, with respect to the direction of the prevailing high winds on September 29, 2002. None of the sites are greater than about 30 miles from Wallula, Washington. A map showing the location of each site is found in Appendix B.

Five of the six stations report no precipitation eight days or more prior to the natural event. Two of the stations, Eby and Finley, report no precipitation 38 days prior to the natural event. Thus, conditions were dry, particularly in light of 20 consecutive hours with 18-30 mph winds.

Table 2. Precipitation prior to a Natural Event due to high winds, May 02, 2002

STATION:	Precipitation 72 hrs. Prior to 9/29/02	Date:	Days prior to 9/29/02, w/no precipitation
Hermiston (HRMO), OR	0.01	9/29	9
Echo, OR	0	NA	8
McNary	0	NA	11
Eby	0	NA	38
Finley	0	NA	38
Touchet	0	NA	11

## BACM Implementation

Ecology has determined that BACM for agricultural fields is being implemented on the Columbia Plateau. This section summarizes recent BACM information for Benton and Walla Walla counties.

### Background

Ecology relies on the federal, state and local agricultural agencies that are responsible for working with farmers regarding implementation of wind erosion conservation practices (BMPs). The USDA Natural Resource Conservation Service (NRCS), Agricultural Research Service (ARS) and local conservation districts lead this effort. Ecology coordinates with these agencies regarding conservation issues on the Columbia Plateau and commits to continuing efforts.

A menu of wind erosion conservation practices (BMPs) have been identified through the NRCS and the Columbia Plateau Wind Erosion/Air Quality Research Project (CP3). The CP3 reports that methods of wind erosion control are based on two principles: 1) reducing the direct force of wind on erodible soil particles, and 2) modifying the soil surface to resist wind action or particle movement.

Certain tillage practices are consistent with these principles in that they increase crop residue and/or surface roughness. The same can be said for enrolling highly erodible land (HEL) in the USDA's Conservation Reserve Program (CRP). The CRP is a USDA Conservation Title Program that allows growers to retire qualified highly erodible fields from crop production and establish either grass or tree cover on the land to control wind and/or water erosion.

Accordingly, Ecology finds the following two approaches establish a basis for conservation practices as BACM:

- 1) Participation in USDA Conservation Title Programs
- 2) Voluntary implementation of conservation practices (BMPs) recognized by the USDA NRCS and/or the Columbia Plateau Wind Erosion/Air Quality Project

### **BACM Definition**

The 2002 NEAP (under development) defines BACM for agricultural fields as conservation programs and practices that abate or minimize wind erosion. A more practical working definition is the USDA Conservation Programs, especially the Conservation Reserve Program (CRP) supplemented by incentive based implementation of wind-erosion BMPs.

### **BACM Tracking**

The Conservation Technology Information Center (CTIC), established in 1982, is a national nonprofit public-private partnership working to promote soil and water quality and equip agriculture with affordable, integrated management systems. The CTIC was founded by a group of agribusiness, governmental agency and association partners, as a special project of the National Association of Conservation Districts (NACD). Funded by both private and public sources, the Center serves numerous corporate, academic, nonprofit, federal, state and multi-state partners.

The CTIC annually conducts a National Crop Residue Management Survey. County level data from the survey is available through the CTIC's Core 4 program. Core 4 tracks conservation (No-Till, Ridge-Till, Mulch-Till) and conventional (0-15 percent and 15-30 percent residue) tillage practices and enrollment in CRP on a county by county basis.

The CTIC's Core 4 program shows that farmers on the Columbia Plateau participate in wind erosion conservation programs and implement conservation practices promoted by USDA's Natural Resource Conservation Service (NRCS) and Washington State University's (WSU) CP3. Ecology uses the Core 4 as a resource for tracking BACM implementation on the Columbia Plateau, given the following understanding. The data on residue management, no-till, ridge-till and mulch-till reflect voluntary conservation practices (BMP) use. These statistics are likely to be dynamic and may change year to year based on drought and economic viability.

### **BACM Determination for Benton and Walla Walla Counties**

Saxton et al (2000) developed a regional windblown dust modeling system for the Columbia Plateau in order to simulate a dust storm that occurred during September 23-25, 1999. This work shows that during high wind speeds accompanying a storm, emissions affecting urban receptors are within approximately 25 miles of the receptor.

High winds and gusts were predominantly out of the southwest on September 29, 2002. In light of this and results from Saxton's source-receptor modeling, Ecology finds agricultural fields lying to the southwest and within about 25 miles of the PM<sub>10</sub> monitor at Wallula, Washington are candidates for contributing to the measured emissions. Accordingly, Ecology prepared a BACM assessment for Benton and Walla Walla counties, using the Core 4 data. The assessment is based on Core 4's 2000 data, the most recent year for which data is available. The summary shows that 75 percent of the total farmable acres in Benton and Walla Walla counties are either in a USDA conservation program, use one of the minimum till practices, or contain 15-30 percent residue. The summary and corresponding Core 4 data can be found in Appendix C.

Washington State determines that BACM for agricultural fields was implemented in Benton and Walla Walla counties on September 29, 2002.

## Findings

The meteorological data from Wallula, Washington shows that September 29, 2002 was characterized by windy and gusty conditions. Wind speeds were in the 20s for as much as nineteen consecutive hours. The high winds were accompanied by gusts that ranged from 22-33 mph. The winds meet Ecology's high wind event definition of the 2002 NEAP, now under development.

Much of the area lying upwind of Wallula, Washington, with respect to the prevailing winds, had received no precipitation for eight or more days prior to the high winds; for areas to the west, records show no rain 38 days prior to high winds. Moreover, Ecology finds that BACM was implemented on agricultural fields in Benton and Walla Walla counties.

Under the dry conditions so common in this area the windy and gusty conditions are likely to raise dust that led to the monitored high PM<sub>10</sub> levels. Therefore, the monitored PM<sub>10</sub> concentration of 197 µg/m<sup>3</sup> at Wallula, Washington, on September 29, 2002, is reasonably attributed to a natural event due to high winds.



# **Appendix A**

## **Wallula, Washington. PM<sub>10</sub> Data**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
AIR QUALITY SYSTEM

Dec. 16, 2002

(81102) PM10 Total 0-10um

SITE ID: 53-071-1001 POC: 2  
 COUNTY: (071) WALLA WALLA  
 CITY: (00000) NOT IN A CITY  
 SITE ADDRESS: NEDROW FARM/WALLULA JUNCTION  
 SITE COMMENTS: PM10 AND SLAMS TSP SITE ESTAB. 2/28/86  
 MONITOR COMMENTS: MODEL: HI-VOL SA1200  
 SUPPORT AGENCY: (1136) WASHINGTON STATE DEPARTMENT OF ECOLOGY  
 MONITOR TYPE: SLAMS  
 COLLECTION AND ANALYSIS METHOD: (063) HI-VOL SA/GMW-1200 GRAVIMETRIC  
 REPORTING ORG: (1136) WASHINGTON STATE DEPARTMENT OF ECOLOGY

STATE: (53) WASHINGTON  
 AQCR: (230) SOUTH CENTRAL WASHINGTON  
 URBANIZED AREA: (0000) NOT IN AN URBAN  
 LAND USE: AGRICULTURAL  
 LOCATION SETTING: RURAL

CAS NUMBER:  
 LATITUDE: 46.122222  
 LONGITUDE: -118.905556  
 UTM ZONE: 11  
 UTM NORTHING: 5109165  
 UTM EASTING: 352760  
 ELEVATION-MSL: 124  
 PROBE HEIGHT: 4

REPORT FOR: 2001

DURATION: 7  
 UNITS: (001) UG/CU METER (25 C)  
 MIN DETECTABLE: 4

DAY	MONTH	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1		14			12	19	75						
2				17									
3												21	11
4										29	51		
5									64				
6			10				16	29					
7		10			17	27							
8				23									
9												24	11
10										59	15		
11									53				
12			15				7	109					
13		10			11	30							
14													9
15													
16											38		
17				11					53			11	
18			28				21	57					
19					20	46							
20				19									
21												11	17
22										48	46		
23									13				
24		17	18				24						
25					59	37		51					
26		12		29									
27												17	15
28										18	9		
29									37				
30							99						
31								21					
NO.:		5	4	5	5	5	6	5	5	4	5	5	5
MAX:		17	28	29	59	46	99	109	64	59	51	24	17
MEAN:		13	18	20	24	32	40	53	44	39	32	17	13

ANNUAL OBSERVATIONS: 59 ANNUAL MEAN: 29 ANNUAL MAX: 109

0 Values marked with 'P' exceed the PRIMARY STANDARD of: 155  
 0 Values marked with 'S' exceed the SECONDARY STANDARD of: 155

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
AIR QUALITY SYSTEM

Dec. 16, 2002

(81102) PM10 Total 0-10um

SITE ID: 53-071-1001 POC: 2

COUNTY: (071) WALLA WALLA

CITY: (00000) NOT IN A CITY

SITE ADDRESS: NEDROW FARM/WALLULA JUNCTION

SITE COMMENTS: PM10 AND SLAMS TSP SITE ESTAB. 2/28/86

MONITOR COMMENTS: MODEL: HI-VOL SA1200

SUPPORT AGENCY: (1136) WASHINGTON STATE DEPARTMENT OF ECOLOGY

MONITOR TYPE: SLAMS

COLLECTION AND ANALYSIS METHOD: (063) HI-VOL SA/GMW-1200 GRAVIMETRIC

REPORTING ORG: (1136) WASHINGTON STATE DEPARTMENT OF ECOLOGY

STATE: (53) WASHINGTON

AQCR: (230) SOUTH CENTRAL WASHINGTON

URBANIZED AREA: (0000) NOT IN AN URBAN

LAND USE: AGRICULTURAL

LOCATION SETTING: RURAL

CAS NUMBER:

LATITUDE: 46.122222

LONGITUDE: -118.905556

UTM ZONE: 11

UTM NORTHING: 5109165

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ELEVATION-MSL: 124

PROBE HEIGHT: 4

REPORT FOR: 2002

DURATION: 7

UNITS: (001) UG/CU METER (25 C)

MIN DETECTABLE: 4

DAY	MONTH											
	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1		10				21	47	71				
2	8			61	134							
3			11									
4												
5									33			
6												
7		7				15	50	28				
8				49	18							
9	12											
10												
11									52			
12								42				
13						25	63					
14	13			28	16							
15												
16												
17									18			
18								35				
19			51			26	35					
20	19			29	25							
21			17									
22												
23									83			
24												
25						34	64	56				
26	6			12								
27			44									
28												
29									P 197			
30								43				
31												
NO.:	5	2	4	5	4	5	5	6	5	0	0	0
MAX:	19	10	51	61	134	34	64	71	197			
MEAN:	12	9	31	36	48	24	52	46	77			

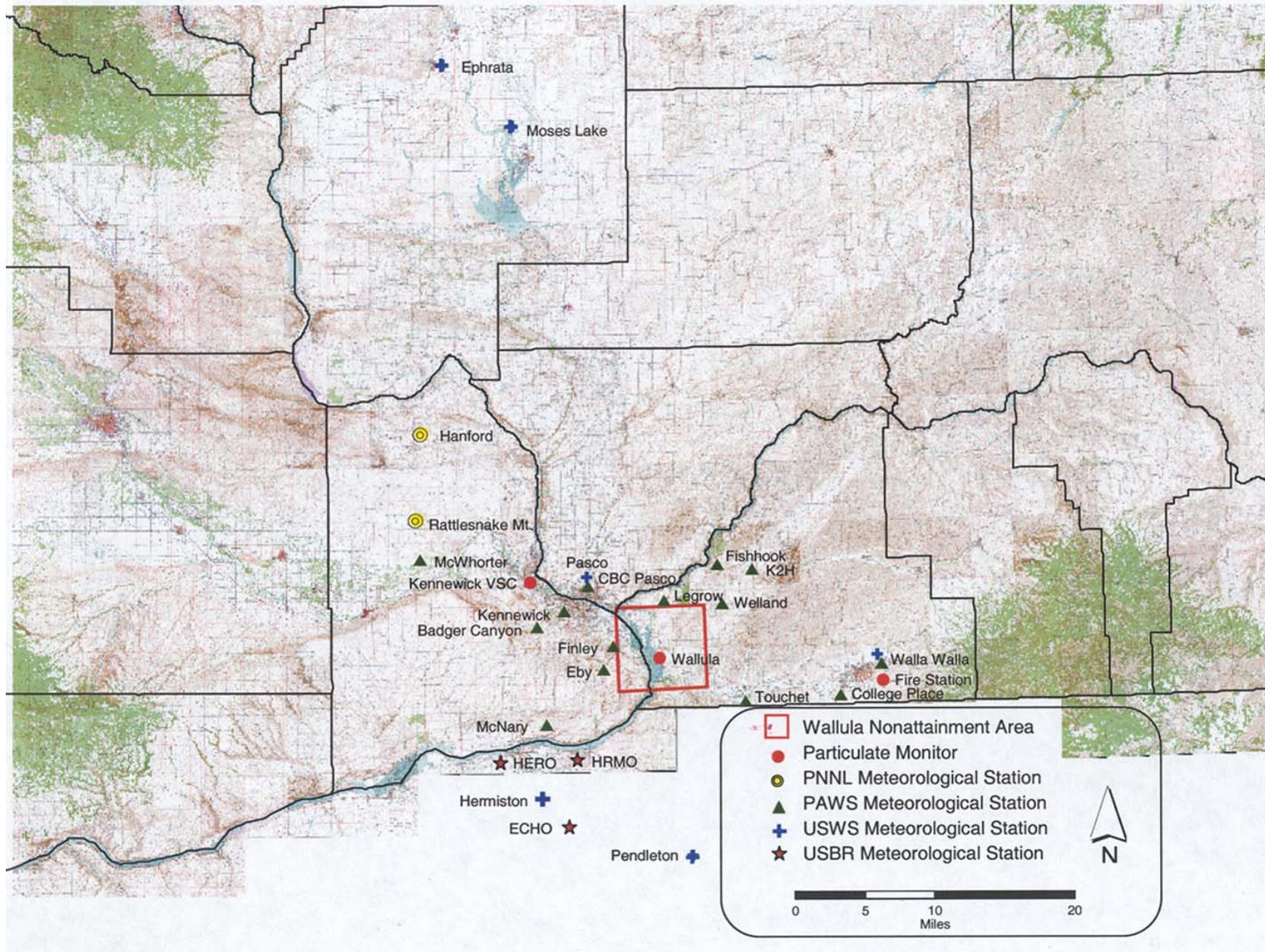
ANNUAL OBSERVATIONS: 41 ANNUAL MEAN: 39 ANNUAL MAX: 197

1 Values marked with 'P' exceed the PRIMARY STANDARD of: 155  
1 Values marked with 'S' exceed the SECONDARY STANDARD of: 155

# **Appendix B**

## **Meteorological Data and Map of Meteorological Stations**





<b>Date</b>	<b>Time</b>	<b>Speed MPH</b>	<b>Gust MPH</b>	<b>Wind Dir. Degrees</b>	<b>Wind Dir. Compass</b>
92802	2000	4	6	61	ENE
92802	2100	3	4	73	ENE
92802	2200	5	5	68	ENE
92802	2300	5	5	92	E
92902	0	5	8	120	ESE
92902	100	8	15	166	SSE
92902	200	11	16	173	S
92902	300	16	18	193	SSW
92902	400	18	22	197	SSW
92902	500	22	24	200	SSW
92902	600	20	23	205	SSW
92902	700	21	25	205	SSW
92902	800	26	29	215	SW
92902	900	26	28	218	SW
92902	1000	24	29	234	SW
92902	1100	23	29	228	SW
92902	1200	27	28	236	WSW
92902	1300	29	31	222	SW
92902	1400	29	32	228	SW
92902	1500	31	33	235	SW
92902	1600	30	31	239	WSW
92902	1700	30	33	243	WSW
92902	1800	26	31	240	WSW
92902	1900	28	32	239	WSW
92902	2000	29	32	242	WSW
92902	2100	29	31	235	SW
92902	2200	23	27	227	SW
92902	2300	25	28	230	SW

## USBR Hydromet Archives Data.txt

### USBR Hydromet Archives Data USBR Pacific Northwest Region Hydromet System Data Access

Although the Bureau of Reclamation makes efforts to maintain the accuracy of data found in the Hydromet system databases, the data is largely unverified and should be considered preliminary and subject to change. Data and services are provided with the express understanding that the United States Government makes no warranties, expressed or implied, concerning the accuracy, completeness, usability or suitability for any particular purpose of the information or data obtained by access to this computer system, and the United States shall be under no liability whatsoever to any individual or group entity by reason of any use made thereof.

BEGIN DATA  
HRMO

DATE	PP
08/21/2002	0.00
08/22/2002	0.00
08/23/2002	0.00
08/24/2002	0.00
08/25/2002	0.00
08/26/2002	0.00
08/27/2002	0.00
08/28/2002	0.00
08/29/2002	0.00
08/30/2002	0.00
08/31/2002	0.00
09/01/2002	0.00
09/02/2002	0.00
09/03/2002	0.01
09/04/2002	0.00
09/05/2002	0.00
09/06/2002	0.00
09/07/2002	0.00
09/08/2002	0.00
09/09/2002	0.00
09/10/2002	0.00
09/11/2002	0.00
09/12/2002	0.00
09/13/2002	0.00
09/14/2002	0.00
09/15/2002	0.00
09/16/2002	0.00
09/17/2002	0.02
09/18/2002	0.00
09/19/2002	0.01
09/20/2002	0.00
09/21/2002	0.00
09/22/2002	0.00
09/23/2002	0.00
09/24/2002	0.00
09/25/2002	0.00
09/26/2002	0.00
09/27/2002	0.00
09/28/2002	0.00
09/29/2002	0.01

END DATA

# USBR Hydromet Archives DataECHO.txt

## USBR Hydromet Archives DataUSBR Pacific Northwest Region Hydromet System Data Access

Although the Bureau of Reclamation makes efforts to maintain the accuracy of data found in the Hydromet system databases, the data is largely unverified and should be considered preliminary and subject to change. Data and services are provided with the express understanding that the United States Government makes no warranties, expressed or implied, concerning the accuracy, completeness, usability or suitability for any particular purpose of the information or data obtained by access to this computer system, and the United States shall be under no liability whatsoever to any individual or group entity by reason of any use made thereof.

BEGIN DATA

ECHO

DATE	P
08/21/2002	0
08/22/2002	0
08/23/2002	0
08/24/2002	0
08/25/2002	0
08/26/2002	0
08/27/2002	0
08/28/2002	0
08/29/2002	0
08/30/2002	0
08/31/2002	0
09/01/2002	0
09/02/2002	0
09/03/2002	0
09/04/2002	0
09/05/2002	0
09/06/2002	0
09/07/2002	0
09/08/2002	0
09/09/2002	0
09/10/2002	0
09/11/2002	0
09/12/2002	0
09/13/2002	0
09/14/2002	0
09/15/2002	0
09/16/2002	0
09/17/2002	0
09/18/2002	0
09/19/2002	0
09/20/2002	0
09/21/2002	0
09/22/2002	0
09/23/2002	0
09/24/2002	0
09/25/2002	0
09/26/2002	0
09/27/2002	0
09/28/2002	0
09/29/2002	0

END DATA



### WSU Public Agricultural Weather System

Data Extracted:2002-12-16-15:10:11

R. EBY, .6 MI S of Finley, Wa

Lat:46.0 Lng:119.0 elevation:1176

Dates Range From 1989-03-31 To 2002-12-15

DATE Gregorian	Total Precip inches
-----	----
2002-08-21	.16
2002-08-22	.00
2002-08-23	.00
2002-08-24	.00
2002-08-25	.00
2002-08-26	.00
2002-08-27	.00
2002-08-28	.00
2002-08-29	.00
2002-08-30	.00
2002-08-31	.00
2002-09-01	.00
2002-09-02	.00
2002-09-03	.00
2002-09-04	.00
2002-09-05	.00
2002-09-06	.00
2002-09-07	.00
2002-09-08	.00
2002-09-09	.00
2002-09-10	.00
2002-09-11	.00
2002-09-12	.00
2002-09-13	.00
2002-09-14	.00
2002-09-15	.00
2002-09-16	.00
2002-09-17	.00
2002-09-18	.00
2002-09-19	.00
2002-09-20	.00
2002-09-21	.00
2002-09-22	.00
2002-09-23	.00
2002-09-24	.00
2002-09-25	.00
2002-09-26	.00
2002-09-27	.00
2002-09-28	.00
2002-09-29	.00

Public Agricultural Weather System

Data Extracted:2002-12-16 15:10:12

FINLEY, 1.5 MI S of Finley, Wa

Lat:46.1 Lng:119.0 elevation:755

Dates Range From 1992-06-02 To 2002-12-15

DATE Gregorian	Total Precip inches
-----	----
2002-08-21	.23
2002-08-22	.00
2002-08-23	.00
2002-08-24	.00
2002-08-25	.00
2002-08-26	.00
2002-08-27	.00
2002-08-28	.00
2002-08-29	.00
2002-08-30	.00
2002-08-31	.00
2002-09-01	.00
2002-09-02	.00
2002-09-03	.00
2002-09-04	.00
2002-09-05	.00
2002-09-06	.00
2002-09-07	.00
2002-09-08	.00
2002-09-09	.00
2002-09-10	.00
2002-09-11	.00
2002-09-12	.00
2002-09-13	.00
2002-09-14	.00
2002-09-15	.00
2002-09-16	.00
2002-09-17	.00
2002-09-18	.00
2002-09-19	.00
2002-09-20	.00
2002-09-21	.00
2002-09-22	.00
2002-09-23	.00
2002-09-24	.00
2002-09-25	.00
2002-09-26	.00
2002-09-27	.00
2002-09-28	.00
2002-09-29	.00

Public Agricultural Weather System

Data Extracted:2002-12-16 15:10:12

MCNARY., 5.5 MI NE of Plymouth, Wa

Lat:45.9 Lng:119.2 elevation:717

Dates Range From 1992-05-12 To 2002-12-15

DATE Gregorian	Total Precip inches
-----	-----
2002-08-21	.19
2002-08-22	.00
2002-08-23	.00
2002-08-24	.00
2002-08-25	.00
2002-08-26	.00
2002-08-27	.00
2002-08-28	.00
2002-08-29	.00
2002-08-30	.00
2002-08-31	.00
2002-09-01	.00
2002-09-02	.00
2002-09-03	.00
2002-09-04	.00
2002-09-05	.00
2002-09-06	.00
2002-09-07	.00
2002-09-08	.00
2002-09-09	.00
2002-09-10	.00
2002-09-11	.00
2002-09-12	.00
2002-09-13	.00
2002-09-14	.00
2002-09-15	.00
2002-09-16	.00
2002-09-17	.02
2002-09-18	.00
2002-09-19	.00
2002-09-20	.00
2002-09-21	.00
2002-09-22	.00
2002-09-23	.00
2002-09-24	.00
2002-09-25	.00
2002-09-26	.00
2002-09-27	.00
2002-09-28	.00
2002-09-29	.00

# Public Agricultural Weather System

Data Extracted:2002-12-16 15:10:13

TOUCHET, 1.5 MI S of Touchet, Wa

Lat:46.0 Lng:118.6 elevation:492

Dates Range From 1989-01-01 To 2002-12-15

DATE Gregorian	Total Precip inches
-----	-----
2002-08-21	.00
2002-08-22	.00
2002-08-23	.00
2002-08-24	.00
2002-08-25	.00
2002-08-26	.00
2002-08-27	.00
2002-08-28	.00
2002-08-29	.00
2002-08-30	.00
2002-08-31	.00
2002-09-01	.00
2002-09-02	.00
2002-09-03	.00
2002-09-04	.00
2002-09-05	.00
2002-09-06	.00
2002-09-07	.00
2002-09-08	.00
2002-09-09	.00
2002-09-10	.00
2002-09-11	.00
2002-09-12	.00
2002-09-13	.00
2002-09-14	.00
2002-09-15	.00
2002-09-16	.02
2002-09-17	.02
2002-09-18	.00
2002-09-19	.00
2002-09-20	.00
2002-09-21	.00
2002-09-22	.00
2002-09-23	.00
2002-09-24	.00
2002-09-25	.00
2002-09-26	.00
2002-09-27	.00
2002-09-28	.00
2002-09-29	.00
2002-08-27	.00
2002-08-28	.00
2002-08-29	.00

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# **Appendix C**

## **BACM Assessment: Benton and Walla Walla Counties**



Washington State Department of Ecology, Air Quality Program  
**BACM Assessment: Benton County and Walla Walla County, Washington**

		<b>BACM (component 1)</b>	<b>BACM (component 2) - ADDITIONAL CONSERVATION MEASURES APPLIED</b>				<b>BACM total (components 1 &amp; 2)</b>	
		<b>CRP</b>	<b>No-Till</b>	<b>Ridge-Till</b>	<b>Mulch-Till</b>	<b>15-30% Residue.</b>	<b>acres</b>	<b>% acres</b>
<b>Benton</b>								
*HEL withdrawn from production	75,132	75,132					75,132	100.00%
Fallow acres	131,488		3,550	0	0	67,979	71,529	54.40%
Total planted acres	232,100		2,488	0	2,212	124,202	128,902	55.54%
Total farmable acres	438,720	<b>17%</b>	6,038	0	2,212	192,181	275,563	<b>62.81%</b>
<b>Walla Walla</b>								
HEL withdrawn from production	148,894	148,894					148,894	100.00%
Fallow acres	125,589		6,279	0	62,795	37,677	106,751	85.00%
Total planted acres	296,552		31,685	0	96,169	98,992	226,846	76.49%
Total farmable acres	571,035	<b>26%</b>	37,964	0	158,964	136,669	482,491	<b>84.49%</b>
<b>SUMMARY</b>								
Total farmable acres	1,009,755	224,026	44,002	0	161,176	328,850	758,054	
		<b>22%</b>	<b>4%</b>	<b>0%</b>	<b>16%</b>	<b>33%</b>		<b>75%</b>
Highly Erodible Land (HEL)								

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### Crop Residue Management

Walla Walla County, Washington

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	Total Planted Acres	Conservation Tillage		Conventional Tillage		
		No-Till	Ridge-Till	Mulch-Till	15-30% Residue	0-15% Residue
Corn (FS)	6,667	667	0	2,667	2,000	1,333
Corn (DC)	0	0	0	0	0	0
Small Grain (SpSg)	91,899	22,871	0	27,653	35,464	5,911
Small Grain (FISg)	138,189	8,147	0	54,311	47,370	28,361
Soybeans(FS)	0	0	0	0	0	0
Soybeans (DC)	0	0	0	0	0	0
Cotton	0	0	0	0	0	0
Grain Sorghum (FS)	0	0	0	0	0	0
Grain Sorghum (DC)	0	0	0	0	0	0
Forage Crops	3,000	0	xxxxxxxx	0	750	2,250
Other Crops	56,797	0	0	11,538	13,408	31,851
<b>TOTAL</b>	<b>296,521</b>	<b>31,685</b>	<b>0</b>	<b>96,169</b>	<b>98,992</b>	<b>69,706</b>
Permanent Pasture	0	0	xxxxxxxx	0	0	0
Fallow	125,589	6,279	xxxxxxxx	62,795	37,677	18,838

<b>Conservation Reserve Program (CRP) Acres</b>
148,894

FS – Full Season	SpSg – Spring Seeded Small Grain
DC – Double Cropped	FISg – Fall Seeded Small Grain

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	Total Planted Acres	Conservation Tillage		Conventional Tillage		
		No-Till	Ridge-Till	Mulch-Till	15-30% Residue	0-15% Residue
Corn (FS)	28,000	1,988	0	2,212	18,004	5,796
Corn (DC)	0	0	0	0	0	0
Small Grain (SpSg)	25,800	500	0	0	9,500	15,800
Small Grain (FISg)	135,000	0	0	0	89,100	45,900
Soybeans(FS)	0	0	0	0	0	0
Soybeans (DC)	0	0	0	0	0	0
Cotton	0	0	0	0	0	0
Grain Sorghum (FS)	0	0	0	0	0	0
Grain Sorghum (DC)	0	0	0	0	0	0
Forage Crops	100	0	xxxxxxxx	0	750	100
Other Crops	43,200	0	0	0	7,598	35,602
<b>TOTAL</b>	<b>232,100</b>	<b>2,488</b>	<b>0</b>	<b>2,212</b>	<b>124,202</b>	<b>103,198</b>
Permanent Pasture	0	0	xxxxxxxx	0	0	0
Fallow	131,488	3,550	xxxxxxxx	0	67,979	59,959

<b>Conservation Reserve Program (CRP) Acres</b>
75,132

FS – Full Season	SpSg – Spring Seeded Small Grain
DC – Double Cropped	FISg – Fall Seeded Small Grain